



Dividend policy and stock price volatility:

Finnish evidence

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Abstract

Dividend policy has been a major field of study in corporate finance for decades, mostly concentrating on the relation of dividend policy and expected stock returns. However, dividend policy has been also used to explain the volatility of stock prices. This research includes a data sample of 131 Finnish public companies, listed on Nasdaq Helsinki's main list during the time period of 1992-2015. The impact of dividend yield and payout ratio on stock price volatility is examined using OLS-regression analysis, while controlling for earnings volatility, leverage, market capitalization and asset growth.

The results provide a "middle road" between Baskin's (1989) results from the US and Allen and Rachim's (1996) results from Australia. Baskin's reported dominant dividend yield coefficient is recognized as significant but not dominant, while Allen and Rachim's emphasis on the effect of earnings volatility and leverage is partly supported. The findings suggest that payout ratio affect price volatility the most, although dividend yield, earnings volatility and market capitalization have an almost equal influence. As expected, dividend yield and payout ratio have a significant negative relationship with price volatility, and simultaneously earnings volatility's coefficient is significant but positive.

Interestingly, against expectations, market capitalization has a significant, but positive relationship with price volatility. This was contrary to Baskin's results but in line with Allen and Rachim's. Two possible explanations are provided: the ownership structure of Finnish small cap companies, and the higher amount of short-term liabilities large cap companies face. The effect of leverage is contradictory to both Baskin, and Allen and Rachim, as leverage have no significant effect on price volatility at all. The bank-orientated capital markets of Finland and the significant negative relationship between earnings volatility and the amount of debt might provide a valid explanation about this matter.

Baskin's suggestion that dividend policy would affect price volatility on its own is not supported. Rather, the results suggest that multiple factors alongside dividend policy explain the volatility of stock prices.

Keywords Dividend policy, dividend yield, payout ratio, stock price volatility, Finland

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1. Introduction

Dividend policy has been a controversial topic in corporate finance for decades. Thousands of empirical and theoretical researches have been made with diverse results, and the debate, whether dividends should be used as a payout policy or not, goes on. Still, researchers suggest that Finnish companies are diligent dividend payers. Maury and Pajuste (2002) claimed that Finnish listed companies pay out approximately 45% of their net earnings in form of dividends. Kowerski (2017) reported that during the years 1993 to 2008, Finnish companies paid annual dividends with a probability of 78,4%. This was the second highest ratio in Europe after Switzerland. Also, the Finnish Central Chamber of Commerce (2016) reported that approximately 72% of Finnish listed companies pay annual dividends.

After Modigliani and Miller (1961) presented their dividend irrelevancy theorem, many papers have been published to prove the relevancy of dividend policies, and payout policies in general. And in practice, clear payout patterns and habits can be perceived. Von Eije and Megginson (2008) stated that in Europe, over the last 30 to 40 years, share repurchases have increased their popularity steadily, whereas the amount of companies paying dividends have decreased significantly. These changes in payout policies imply that in practice, payout policies matter, and they must be adjusted to current legislations and preferences. Some investors might prefer stable cash flows in form of annual or quarterly dividends, some might prefer to postpone profits, and consequently, capital gain taxes to the future. Pettit (1977) studied these time preferences towards payout policies and he found significant differences between investor types. Also, the level of taxation is constantly changing, forcing companies and investors to re-analyze payout policies and their rationality.

In finance literature, the information content of dividends is supported strongly by multiple researchers. Lintner (1956) was the first to discover the effects of dividend announcements on stock prices. Furthermore, Watts (1973) explained that dividend announcements include information about the management's views of future earnings. Allen and Rachim (1996), cited Baskin (1989), who proposed that dividends could be used as a proxy for the risk of future earnings. Baskin, with data from the United States, suggested that with the help of the information content of future earnings included in dividend payments, managers might be able to affect stock price volatility, and therefore, stock market risk and prices. Allen and Rachim's (1996) reworked this Baskin's paper with Australian data. This research is based on the framework of Allen and Rachim's (1996) and Baskin's (1989) papers, in a Finnish context.

The research is divided into five main sections: next, a literature review will be conducted. Sector 3 includes the description of the data used and the research method. Sector 4 will be discussing the found results, and the final section will include the conclusion of this research.

2. Literature Review

2.1 Dividend irrelevance theorem and the irrelevance of the dividend irrelevance theorem

Modigliani and Miller (1961) published the dividend irrelevance theorem, demonstrating that dividends do not affect the market value of the company. The theorem has been famously compared to a pie, and the different payout policies are like slicing the pie to different pieces. Slicing the pie differently leads to different payout outcomes, but the size of the pie, representing the market capitalization of the company, does not change. However, the dividend irrelevance theorem assumed markets without any imperfections,

such as taxes, transaction costs, signaling effects and information asymmetries. Models including market imperfections reported different results. Jensen and Meckling (1976) stated that agency costs cause the relevance of dividend policy, notifying that the concept of a publicly held corporation is based on trust and monitoring. Investors pour billions of dollars, pounds, rubles, etc. into the hands of managers and simultaneously delineate their own opportunities to affect decision making in the corporation. Despite the potentially significant agency costs, the disciplinary mechanisms targeted at company management, such as dividend policy, work, as society has not invented a better form of organization than a publicly held company (Jensen and Meckling). Rozeff (1982) backed this up, suggesting that managers distributing excessive cash holdings to shareholders in forms of steady, annual dividends have limited opportunities to spend surplus cash on unnecessary perks, negative NPV investments, empire building or other organizational inefficiencies.

Another viewpoint of dividend policy's relevance to the value of the company, the importance of the tax clientele effect, was emphasized by DeAngelo and Masulis (1980). The clientele effect is based on investor preferences and is closely tied to Baskin's (1989) retained earnings effect. Investors preferring to postpone capital gain taxes invest in low dividend yield companies, which use retained earnings to fund long-term growth. The expected profits are realized in the future, based on increased company valuation after profitable investments. Postponing capital gain taxes can be value adding for certain investor groups, for example for individuals currently in high tax brackets, making dividend policy relevant in form of company value. Other investor groups may prefer high current investment income, implying investment in high dividend yield and payout companies. These investors regard current investment income as more valuable than future capital gains, making companies providing high dividend payouts more valuable to them. Pettit (1977) found significant results in explaining dividend yield variations in individuals' portfolios by time preferences and tax brackets.

Modigliani and Miller's (1961) dividend irrelevance theorem stated that a company's optimal payout policy is a by-product of its investment choices. MM argued that a company must distribute 100% of its free cash flow to shareholders as that maximizes the present value of cash flows the investors receive, and the amount of cash flow available to distribution depends on the successfulness of its investments. Therefore, payout policy has no impact on company value: companies are valued based on their investment policy only. DeAngelo H. and DeAngelo L. (2006) contradicted this, and they added the possibility of cash flow retention to the theory. Holding the net present value of investment policy fixed, and allowing cash flow retention, companies can reduce their value by distributing less than the maximum present value of their free cash flows. Adding the possibility of cash flow retention to Modigliani and Miller's (1961) model, payout policy affects company value, as it is no longer just a by-product of investment policy. DeAngelo H. and L. (2006) cited Rubinstein (1976), who distributed less than 100% of the firm's free cash flow out to shareholders in his model. The undistributed cash was retained and invested in zero-NPV projects generating additional future profits, which's present values equaled the present values of the undistributed free cash flows. If the company eventually distributes the extra profits, investors without time preferences maximize their wealth with any level of free cash flow distribution. Therefore, there are not a single optimal payout policy, like Modigliani and Miller (1961) stated. Adding time preferences and positive NPV investments to Rubinstein's (1976) calculations, payout policy affects company valuation. Companies should not distribute 100% of their free cash flow to shareholders if companies have positive NPV investments in sight, and these investments are expected to yield bigger earnings than shareholders can generate on their own. Also, if shareholders possess time preferences, they value companies higher with payout policies suitable for their needs. In conclusion, a company does not maximize shareholder value only by maximizing the NPV of investment policy: the NPV or payout policy needs to be maximized as well.

After Lintner's (1956) discovery of the existence of dividend announcement effects on stock returns, many different findings related to dividend policy and its effects on expected stock returns have been found. For example, Black and Scholes (1974) suggested that high dividend yield stocks and low yield stocks provide similar expected returns, but Sharpe and Sosin (1976) argued that high dividend yield stocks offered lower betas, leading to lower excess returns, whereas low dividend yield stocks had higher betas and higher excess returns. Dividend policy was frequently related to expected stock returns, until Baskin (1989) published his paper on dividend policy's impact on stock price volatility.

2.2 Description of Baskin's (1989) study

Baskin's (1989) paper discussed the impact of dividend policy on stock price volatility. Baskin approached dividend policy from a different angle, as dividend policy's impact on stock returns was a common research topic before Baskin's paper (for example Gordon, 1963), but there were no previous significant publications on dividend policy's impact on price volatility (Allen and Rachim, 1996).

The number of factors affecting a company's dividend policy and stock price volatility are numerous. Many of these factors are impossible to capture numerically. However, accounting data include various sets of numerical information, which can be considered as measures of risk. Allen and Rachim (1996) reported that Baskin (1989) used the following control variables trying to capture the significance of dividend yield on stock price volatility: payout ratio, the volatility of EBIT-ratio, market capitalization, the ratio of long-term debt to total assets, and asset growth rate. All of these variables are considered to have an impact on stock price volatility and on dividend yield. For example, a large amount of long-term debt in a company's balance sheet constantly exposes the company to large interest payments. If these large interest payments are simultaneous with a highly volatile EBIT-ratio, most probably the stock price will also be highly volatile, because of the company's uncertain solvency. But high debt-ratios and volatile earnings affect the dividend yield as well: because of the information content of dividends, companies are reluctant to decrease them in the fear of a declining stock price, leading to a preference of smaller, but stable dividends. Baskin (1989) reported three main reasons that relate dividend policy to price volatility: the duration effect, the rate of return effect, and the informational effect (Allen and Rachim, 1996).

Baskin's (1989) first reason to explain dividend policy's impact on price volatility was the duration effect. It was described by Allen and Rachim (1996) followingly: stocks offering a high dividend yield are more resistant to changes in discount rates, and therefore, the stocks price volatility is lower. This is because a high dividend yield offers larger cash flows in the near future. The changes in discount rates do not affect the present values of expected cash flows as radically close to the examination period than the present values of cash flows many years away, because the denominator increases in a NPV equation as time passes by. Consequently, the price of the stock changes less when big cash flows incur close to the starting period. Allen and Rachim (1996) notified that the discount rate sensitivity described in the duration effect represent mostly undiversifiable risk.

$$NPV = \frac{C}{1+r} + \frac{C}{(1+r)^2} + \frac{C}{(1+r)^3} + \dots + \frac{C}{(1+r)^T}$$

Figure 1: The basic NPV formula. Having big cash flows during the first years make the equation less sensitive to changes in r , than having end-weighted cash flows.

The rate of return effect is based on the assumption that companies with small payout ratios and low dividend yields are valued by their investment opportunities in the future, rather than their current assets and operations (Allen and Rachim, 1996). Companies with growth opportunities do not want to distribute their cash out in forms of dividends, as they rather retain their earnings for future investment opportunities. As the pecking order theory of corporate finance implies, retained earnings are the least information sensitive and the cheapest form of funding investments (Myers and Majluf, 1984). Therefore, companies with growth opportunities prefer to retain a large portion of their earnings, leading to a low payout ratio. Consequently, payout ratio and dividend yield may have predictive power over growth opportunities. It seems sensible to assume that predicting future profits from future investments is more error prone than forecasting profits from current operations. Therefore, companies with low payout ratios and dividend yields might offer more volatile returns. Applying the logic of the rate of return effect, high dividend yield companies face fewer attracting investment opportunities, providing easier prediction of future cash flows. According to Baskin (1989), this leads to a less volatile stock price.

Allen and Rachim (1996) reported that Baskin (1989) described his information effect as the traditional idea of dividends containing the managements views of future earnings. Companies prefer smooth, steadily increasing dividends. Brealey, Myers and Allen (2011) reported that 93,4% of US executives are avoiding reducing dividends, even in financially tricky situations. Also, nearly 80% of the executives did not want to increase dividends if facing a small risk of having to reverse the decision. Decreasing dividends is a signal to investors about the management's negative opinions of future earnings, whereas increasing dividends inform investors of the management's positive outlooks for the company (for example, Ross (1977), Battacharya (1979), Divecha and Morse (1983), Miller and Rocks (1985)). Therefore, investors make big assumptions based on dividend policy. This could imply that managers could affect the volatility of stock prices by altering dividend policy. The informational effect combined with the rate of return effect and the duration effect suggests that an increase in dividend yield and payout ratio could decrease the volatility of stock prices.

As seen from Baskin's (1989) three main reasons, both dividend yield and payout ratio are relevant explaining dividend policy's effect on stock price volatility. The duration effect is based on dividend yields, but in the rate of return effect both the payout ratio and dividend yield are included. Therefore, it is sensible to include both ratios into this research. Also, derived from the duration and the rate of return effect, dividend yield and payout ratio could predict investment opportunities and consequently, growth rates in assets.

This research studies dividend policy's impact on stock price volatility with Finnish company data. The framework of this research is based on the papers of Baskin (1989) and Allend and Rachim (1996). The null hypothesis of this research is that payout ratio, dividend yield, and other control variables have no effect on stock price volatility, and that different industry-specific characteristics do not influence this relationship either.

3. Research method

3.1 Data

The data in this research contains a total sample of 131 companies, which are listed or were listed on Nasdaq Helsinki's main list during the time period 1992-2015. Although, for many companies, data was not available until the late 90's. Many companies started to publish annual reports online from 1998 or 1999 and DataStream also provided financial statement data of Finnish companies mostly from the late 90's

onward. From the total sample, 96 of these companies are currently listed, and 35 companies have delisted from the stock exchange. Five years of public stock price history was required to make a sufficient amount of measurements, therefore the most recently listed companies included into this research have been on Nasdaq Helsinki since 2011.

Most of the data needed was collected from Asiakastieto's database, which contain accounting information reported by the companies themselves. However, the database contained data only from the 600 biggest companies in Finland, and as many small cap companies are listed on Nasdaq Helsinki, it was required to manually search and extract data from their annual reports. Also, Asiakastieto's database did not provide information about market capitalizations and stock prices, so these were collected from DataStream or from annual reports.

The total sample of 131 companies were classified into four broad industry groups: industrials, services, technology and financials. The data included 59 industrial, 31 service, 27 technology and 14 financial companies. To tackle biased results, more precise industry sampling was avoided in favor of keeping large enough samples.

3.2 Variable definitions

Price volatility

Price volatility is the dependent variable used in this research. Price volatility was calculated for all companies by dividing the annual range between the stocks opening and closing prices by the average of these prices, and then raised to second power. These yearly variances were averaged and transformed to a standard deviation using a square root transformation, to acquire the average price volatility for each company.

Dividend yield

Dividend yield was calculated by dividing all the annual cash dividends paid to common shareholders by the market value of the company at the beginning of the year. The yearly ratios were averaged for each company. Capital repayments from the invested unrestricted equity fund or other unrestricted funds were not considered as dividends.

Payout ratio

This variable was calculated by dividing annual cash dividends paid to common shareholders by the company's net result. Then, the yearly ratios were averaged for each company. Some adjustments were needed, as the payout ratio gets easily extreme values. As many companies pay sticky dividends regardless of their net result, the payout ratio can reach ratios of over 70. Such extreme ratios bias the average payout ratio. Therefore, following Allen and Rachim (1996), the payout ratio was limited to one or minus one in cases where total paid dividends exceeded net results.

Earnings volatility

First, for each year, earnings before interests and taxes (EBIT) to total asset ratios were calculated. Then, company-specific standard deviations were calculated from these EBIT to total asset ratios.

Market capitalization

For most companies, market capitalizations were calculated by multiplying the number of shares outstanding with the stock price at the beginning of the year. For some companies, the market capitalization was extracted from annual reports. The yearly capitalizations were averaged over the period for each company and converted to a natural logarithm transformation.

Long-term debt

The sum of debentures and loans with a maturity of over one year was divided by the total amount of assets for each year. The yearly ratios were averaged over the period for each company.

Growth in assets

The yearly growth rate was calculated by dividing the amount of total assets at the beginning of the year by the amount of assets at the end of the year. These growth rates were averaged for each company.

3.3 Method

Table 1: Summary statistics of the total sample (number of observations 131)

All companies	Price volatility	Dividend yield	Payout ratio	Long term debt	Asset growth	Earnings volatility	Market cap
Average	0,399	0,040	0,344	0,187	0,076	0,056	5,332
Standard deviation	0,142	0,023	0,253	0,115	0,089	0,039	1,830

Table 1 provides summary statistic for the variables used from all 131 companies. The company-specific variables were averaged, and standard deviations were also calculated from these variables. The total sample provided similar summary statistics than Allen and Rachim's (1996) Australian data. Australian companies had slightly higher payout ratios and significantly higher dividend yields, although the difference in dividend yields arise because Finnish companies had much higher market capitalizations. Finnish companies are not bigger than Australian ones in the present, but historically the market capitalizations of publicly listed companies have increased tremendously. Also, Australian companies had much higher asset growth rates than Finnish ones. However, Finnish companies had higher long-term debt to asset ratios than their Australian counterparts, while price and earnings volatilities were similar.

The data sample used in this research contained both currently listed and delisted companies from the time period 1992-2015. Details of the summary statistics for these two separated groups are provided in Appendix A.

This research used ordinary least squared regressions with multiple right-hand-side variables. The first test was to regress the dependent variable, stock price volatility, against the two independent variables, dividend yield and payout ratio. This can be seen as a basic test of the relationship between stock price volatility and dividend policy. Equation 1 was:

$$Pricevol = a_1 + a_2 Divyield + a_3 Payout + e$$

Based on Baskin (1989) and Allen and Rachim (1996) It is expected that dividend yield and payout ratio would have a negative correlation with stock price volatility, meaning an increase in dividend yield and payout ratio would lead to less volatility in the stock price.

Problems may arise with Equation 1 above. Payout ratio and dividend yield are most likely highly correlated with each other: they both have the same numerator, paid dividends. Therefore, a high payout ratio means usually a high dividend yield and vice versa. Also, countless other factors influence a company's dividend policy and stock price volatility, and many cannot be even captured in a numerical format. Adding control variables into the regression limits the influence of the problems with Equation 1.

Control variables are included into Equation 2:

$$Pricevol = a_1 + a_2 Divyield + a_3 Payout + a_4 Earningsvol + a_5 Debt + a_6 Marketcap + e$$

The expectation is that earnings volatility and the amount of long-term debt would have a positive correlation with stock price volatility. Volatile earnings mean high volatility in expected future cash flows, leading to a more volatile stock price. High leverage is considered as a potential risk factor and it increases the uncertainty of free cash flows to investors, making stock prices more volatile. Also, in addition with dividend yield and payout ratio, it is expected that market capitalization has a negative correlation with price volatility. Smaller companies tend to operate in more dynamic industries, such as high-tech, programming or bio-tech, making them grow and decline rapidly. Large corporations are more diversified and operate in asset dominant industries, making sudden industry revolutionizing innovations improbable.

The relationship between price volatility and dividend policy might be also affected by industry-specific characteristics. The influence of these industry characteristics is examined by adding dummy variables, representing four different industries, to Equation 3:

$$Pricevol = a_1 + a_2 Divyield + a_3 Payout + a_4 Earningsvol + a_5 Debt + a_6 Marketcap + a_7 Dum1 + a_8 Dum2 + a_9 Dum3 + e$$

The coefficient for the first dummy variable is captured in the intercept. The industry coefficients are reported relative to the missing dummy variable, which in this case is the technology industry.

Also, a regression was made to study the differences of currently listed companies and companies which delisted during the time period. Dummy variables were added to Equation 4 to represent current and delisted companies:

$$Pricevol = a_1 + a_2 Divyield + a_3 Payout + a_4 Earningsvol + a_5 Debt + a_6 Marketcap + a_7 Dum1 + e$$

The coefficient for the other dummy variable is captured in the intercept. In this case, currently listed companies are reported relative to the missing dummy variable, which is delisted companies. See Appendix B for results.

4. Results

Assuming that stock prices are normally distributed, the standard deviation of stock market returns equivalent to the averaged price volatility (Table 1) can be estimated (Allen and Rachim, 1996). The standard deviation is calculated by multiplying the average volatility of 0,399, by 0,6008, a constant derived by Parkinson (1980). This gives a result of 24% standard deviation of stock market returns. Allen and Rachim (1996) reported a result of 29,42%, which is comparable to the standard deviation found in Finnish data.

The correlations between the used variables are reported in Table 2. As seen, price volatility is negatively correlated with dividend yield (-0,5) and payout ratio (-0,47). Table 3 shows the p-values of these correlation coefficients, and as both coefficients have a p-value of 0,000, these correlations are statistically significant, even on a 0,1% significance level. Interestingly, Allen and Rachim (1996) found a positive correlation of 0,006 between price volatility and dividend yield, and an expected -0,210 correlation between price volatility and payout ratio in their Australian data. On the other hand, Baskin (1989) reported significant negative correlations between price volatility and dividend yield (-0,643), and payout ratio (-0,542) in US data.

Table 2 also shows a strong correlation of 0,58 between dividend yield and payout ratio. This statistically significant correlation, with a p-value of 0,000, was expected, as both ratios include the same numerator, total cash dividends paid. The correlation of 0,58 is the highest in Table 2, equivalent to Allen and Rachim (1996), who reported a correlation of 0,424 between the two variables. This is a potential problem of multicollinearity, as the variables are highly correlated, requiring some robustness checks later.

Table 2: Correlations between the variables

Correlation	<i>Pricevol</i>	<i>Divyield</i>	<i>Payout</i>	<i>Debt</i>	<i>Assetgrowth</i>	<i>Earningsvol</i>	<i>Marketcap</i>
<i>Pricevol</i>	1						
<i>Divyield</i>	-0,5	1					
<i>Payout</i>	-0,47	0,58	1				
<i>Debt</i>	0,03	-0,07	-0,17	1			
<i>Assetgrowth</i>	0,16	0,05	0,16	-0,07	1		
<i>Earningsvol</i>	0,35	-0,21	-0,25	-0,3	-0,05	1	
<i>Marketcap</i>	0,03	0,2	0,36	0,14	0,16	-0,3	1

Table 3: P-values of correlations between the variables

P-values	<i>Pricevol</i>	<i>Divyield</i>	<i>Payout</i>	<i>Debt</i>	<i>Assetgrowth</i>	<i>Earningsvol</i>	<i>Marketcap</i>
<i>Pricevol</i>							
<i>Divyield</i>	0,0000						
<i>Payout</i>	0,0000	0,0000					
<i>Debt</i>	0,7366	0,4546	0,0585				
<i>Assetgrowth</i>	0,0765	0,6021	0,0599	0,4125			
<i>Earningsvol</i>	0,0000	0,0146	0,0035	0,0006	0,5768		
<i>Marketcap</i>	0,7578	0,0237	0,0000	0,103	0,0727	0,0005	

The correlations mention above are expected, and potentially problematic without control variables. Allen and Rachim (1996) stated statistically significant positive relationships between price volatility and market capitalization (0,298), as well as between leverage and price volatility (0,335). Interestingly, Finnish data did not include significant correlations between these variables (both 0,03). Also, there was no significant correlation between leverage and market capitalization (0,14), which was found in the Australian data. But market capitalization and earnings volatility have a significant negative correlation of -0,3, which is expected, as large corporations work in more stable industries than small ones.

Both dividend yield and payout ratio have significant negative correlations with earnings volatility. This is expected, as companies with volatile earnings do not want to commit to big, sticky dividends (Brealey, Myers, Allen, 2011). Companies with volatile earnings usually borrow less, because of increased solvency

risks investors are not willing to issue debt for them. This can be seen as a significant negative correlation between earnings volatility and leverage.

Table 4: Result of regression $Pricevol = a_1 + a_2 Divyield + a_3 Payout + e$

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.53600	0.02150	24.927	< 2e-16	***
div	-2.16645	0.55952	-3.872	0.000171	***
payout	-0.14680	0.05073	-2.893	0.004479	**

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					
Residual standard error: 0.1199 on 128 degrees of freedom					
Multiple R-squared: 0.2984, Adjusted R-squared: 0.2875					
F-statistic: 27.22 on 2 and 128 DF, p-value: 1.407e-10					

Table 4 shows the results from Equation 1. The results are expected: both dividend yield and payout ratio have a negative relationship with price volatility, which are significant at the 1% level. Dividend yield is significant even on the 0,1% level. These results are in line with Baskin (1989) and his explanations, on how dividend policy affects stock price volatility. As the duration effect, the rate of return effect and the information effect predict, high dividend yield and payout companies should offer lower price volatility. However, puzzlingly, Allen and Rachim (1996) reported a positive, insignificant relationship between dividend yield and price volatility. This is contradictory to expectations. Interestingly, Ball et al. (1979) reported a significant negative relationship between estimates of market risk and dividend yields with Australian data, like Allen and Rachim (1996), although with different estimates of market risk. However, Equation 1 did not include control variables.

Table 5: Result of regression $Pricevol = a_1 + a_2 Divyield + a_3 Payout + a_4 Earningsvol + a_5 Debt + a_6 Marketcap + e$

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.358858	0.046326	7.746	2.81e-12	***
div	-1.965839	0.519362	-3.785	0.000237	***
payout	-0.172723	0.051083	-3.381	0.000964	***
earningsvol	1.062426	0.279332	3.803	0.000222	***
debt	0.003451	0.092421	0.037	0.970276	
size	0.022202	0.005891	3.769	0.000251	***

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ' ' 1
Residual standard error: 0.1109 on 125 degrees of freedom					
Multiple R-squared: 0.4146, Adjusted R-squared: 0.3911					
F-statistic: 17.7 on 5 and 125 DF, p-value: 3.103e-13					

Table 5 includes the results from Equation 2. After adding control variables to the regression, it can be seen that dividend yield and payout ratio have still a negative relationship with price volatility and are now both significant at the 0,1% level. This is expected, and as Baskin (1989) predicted. Earnings volatility's positive and significant relationship with price volatility is also expected. Interestingly, leverage ratio was not significant at all. Also, contrary to expectations, the results above report a significant positive relationship between market capitalization and stock price volatility. Allen and Rachim (1996) explained their positive and significant market capitalization coefficient with suggesting that larger companies borrow more than small companies, and as the leverage ratio variable includes only long-term debt, the market capitalization variable picks up the effect of short-term liabilities.

Another possible explanation of market capitalization effect is provided by the ownership structure of Finnish listed companies. Faccio and Lang (2002) reported that 49 % of publicly traded Finnish companies are family-owned, whereas in the UK, an example of Anglo-American markets, only 24% of publicly traded companies were family-owned. Faccio and Lang described family ownership by a shareholder owning more than 20% of company stock. In the same paper, Faccio and Lang stated that 65,2% of small cap companies in the Helsinki Stock Exchange were family-owned. Family-owned companies execute more cautious investment policy, because most of the wealth of majority owners is concentrated into the single company. This implies that the significant positive relationship between price volatility and market capitalization in Table 5 could be partly explained by careful, illiquid, family-owned small caps, and large caps with a more diversified ownership base, willing to take on more risk as the owners have diversified their wealth to multiple different companies. As Baskin's data from the US was a representative of Anglo-American markets, the differences in the coefficients could possibly be explained by the structure of ownership.

Comparing the findings from Finnish data to Allen and Rachim's (1996) Australian data, earnings volatility and market capitalization have similar significant and positive relationship with price volatility. Also, payout ratio has a similar significant negative relationship. The differences occur with dividend yield and leverage ratio. In the Finnish data sample, dividend yield is negative and significant, as expected and as was in Baskin's (1989) US data, whereas the Australian data provided an insignificant positive coefficient. However, Allen and Rachim's (1996) argued that their positive dividend yield coefficient was spurious and the result of multicollinearity. Also, leverage ratio was insignificant in Finnish data, but it was significant in both Allen and Rachim's Australian data, and Baskin's US data.

A possible explanation for leverage can be derived from the differences between bank orientated capital markets in Finland and market orientated capital markets in the Anglo-American countries. Diamond (1984) claimed that banks exist because they are experts in monitoring and assessing debtors. As Finland's capital markets are highly bank-orientated, meaning that most companies receive external debt financing from banks, not from the capital markets, investors might interpret companies even with high leverage, as relatively low risk investments. Investors trust that banks have monitored and assessed the high-leverage companies properly and therefore debt-levels might not affect stock price volatility as strongly as in market-orientated capital markets. Equation 5 was constructed to support this hypothesis:

$$Earningsvol = a_1 + a_2 Divyield + a_3 Payout + a_4 Debt + a_5 Marketcap + a_6 + Assetgrowth$$

Table 6: Result of regression $Earningsvol = a_1 + a_2 Divyield + a_3 Payout + a_4 Debt + a_5 Marketcap + a_6 + Assetgrowth$

Coefficients:				
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.110745	0.011178	9.908	< 2e-16 ***
div	-0.151318	0.166025	-0.911	0.363828
payout	-0.029570	0.016243	-1.820	0.071078 .
debt	-0.104995	0.028137	-3.732	0.000288 ***
size	-0.003572	0.001872	-1.908	0.058623 .
asset	-0.004128	0.035545	-0.116	0.907738

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.' 0.1 ' ' 1
Residual standard error: 0.0355 on 125 degrees of freedom				
Multiple R-squared: 0.2094, Adjusted R-squared: 0.1778				
F-statistic: 6.622 on 5 and 125 DF, p-value: 1.676e-05				

As seen from Table 6, leverages relationship with earnings volatility is significant (on a 0,1% level) and negative. In Finland, the causality might run from a banks point of view: companies with highly volatile earnings possesses bigger repayment risks, thus banks are reluctant to lend money for them. This might

imply why leverage does not possess a negative relationship with price volatility, as banks lend money only to companies with stable earnings. And as Table 5 reports, earnings volatility is highly significant and positive relative to price volatility.

As dividend yield and payout ratio are highly correlated, some robustness checks were made. Allen and Rachim (1996) experienced some difficulties with the positive correlation of dividend yield and price volatility, so they dropped one of the dividend policy variables and re-ran the regression to see if the high correlation of payout ratio and dividend yield would affect the other variables. Although the Finnish data produced significant negative relationship between dividend yield and price volatility, the same regressions than Allen and Rachim conducted were made in this research because of the high correlation between payout ratio and dividend yield.

Table 7: Result of regression $Pricevol = a_1 + a_2 Divyield + a_3 Earningsvol + a_4 Debt + a_5 Marketcap + e$

Coefficients:				
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.344549	0.048005	7.177	5.41e-11 ***
div	-2.889904	0.459562	-6.288	4.82e-09 ***
earningsvol	1.216255	0.286785	4.241	4.27e-05 ***
debt	0.083236	0.092984	0.895	0.37241
size	0.016266	0.005851	2.780	0.00627 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 0.1154 on 126 degrees of freedom				
Multiple R-squared: 0.361, Adjusted R-squared: 0.3407				
F-statistic: 17.8 on 4 and 126 DF, p-value: 1.323e-11				

Table 7 shows the results without payout ratio. As seen, omitting payout ratio from the regression does not alter the results dramatically. The t-values of all variables increased, except market capitalization's. Dividend yield absorbed most of explanatory power of payout ratio, producing a t-value of less than -6. However, there were no dramatic changes in the variables, compared to Allen and Rachim (1996) who experienced a shift from a positive to a negative dividend yield.

Omitting dividend yield from the regression gives similar results than omitting payout ratio. This can be seen from Table 8. Now, payout ratio absorbs most of the explanatory power of dividend yield, giving a t-value of less than -6, and the other variables remain basically the same. The high correlation between payout ratio and dividend yield is not causing misleading results with this data sample.

Table 8: Result of regression $Pricevol = a_1 + a_2 Payout + a_3 Earningsvol + a_4 Debt + a_5 Marketcap + e$

Coefficients:				
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.3076781	0.0465937	6.603	1.01e-09 ***
payout	-0.2744676	0.0456781	-6.009	1.87e-08 ***
earningsvol	1.1478416	0.2927734	3.921	0.000144 ***
debt	-0.0008896	0.0971787	-0.009	0.992710
size	0.0229176	0.0061912	3.702	0.000319 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 0.1166 on 126 degrees of freedom				
Multiple R-squared: 0.3475, Adjusted R-squared: 0.3267				
F-statistic: 16.77 on 4 and 126 DF, p-value: 4.788e-11				

It is possible that industry-specific characteristics effect significantly dividend policy's impact on stock price volatility. Table 9 provides industry specific summary statistics, including industrial, service, technology and financial companies. It is notable, that technology companies have significantly more volatile stock prices

and earnings than the other industries. The technology industry is known for its dynamic competition, continuous innovation, rapidly growing companies and quick bankruptcies. As seen from Table 9, technology companies pay also significantly smaller dividends, have little debt, and are the smallest. Another distinguishable feature from Table 9 is the small price and earnings volatilities of financial companies.

Table 9: Industry specific summary statistics

	Price volatility	Dividend yield	Payout ratio	Long term debt	Asset growth	Earnings volatility	Market cap	
Manufacturing/Industrials	0,390	0,041	0,342	0,204	0,067	0,048	5,535	Average
	0,105	0,019	0,230	0,084	0,074	0,027	1,805	Standard deviation
Services	0,358	0,042	0,417	0,191	0,070	0,049	5,157	Average
	0,132	0,020	0,266	0,119	0,089	0,029	1,330	Standard deviation
Technology	0,504	0,029	0,265	0,111	0,091	0,089	5,055	Average
	0,181	0,023	0,282	0,075	0,101	0,055	2,127	Standard deviation
Financial	0,327	0,053	0,340	0,254	0,105	0,038	5,400	Average
	0,095	0,033	0,206	0,185	0,112	0,026	2,139	Standard deviation

Next, dummy variables representing these four industries will be added to a regression. Table 10 includes the result from Equation 3. The technology industry dummy is captured in the intercept, so the service, industrial and financial dummies are reported relative to the technology variable.

Table 10: Result of regression $Pricevol = a_1 + a_2 Divyield + a_3 Payout + a_4 Earningsvol + a_5 Debt + a_6 Marketcap + a_7 Dum1 + a_8 Dum2 + a_9 Dum3 + e$

Coefficients:				
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.415349	0.050476	8.229	2.4e-13 ***
divyield	-1.633783	0.531752	-3.072	0.00262 **
payout	-0.168394	0.051257	-3.285	0.00133 **
earningsvol	0.794094	0.291360	2.725	0.00737 **
debt	0.088017	0.095649	0.920	0.35928
size	0.019764	0.005875	3.364	0.00103 **
services	-0.077293	0.032146	-2.404	0.01770 *
industrials	-0.065988	0.029029	-2.273	0.02477 *
financial	-0.104076	0.041848	-2.487	0.01423 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 0.1088 on 122 degrees of freedom				
Multiple R-squared: 0.4502, Adjusted R-squared: 0.4141				
F-statistic: 12.49 on 8 and 122 DF, p-value: 5.74e-13				

As seen from Table 10, adding industry dummy variables do not change dividend policy's variables or control variables significantly. All variables lose one significance level, but they are still statistically significant on a 1% level. The dummy variables show expected results. The dummies representing industrial, service and financial companies show significantly less (on a 5% level) price volatility than the technology dummy, which is captured in the intercept. This is not surprising considering the technology sectors nature. As the three other industries have all almost the same t-values relative to the technology sector, it is safe to assume that these three industries do not possess major differences. See Appendix C for more information.

From Baskin's (1989) three reasons to relate dividend policy to stock price volatility, it could be interpreted that the duration and the rate of return effects might be correlated with the growth rate in companies' total assets, as discussed earlier in Section 2. As the growth rate of total assets is connected to positive investment opportunities, low payout companies should have higher asset growth rates, because instead of

distributing the majority of retained earnings, they invest them in new operations. And as Baskin's rate of return effect and duration effect explained, low payout companies offer more volatile stocks, so consequently asset growth should have a positive relationship with price volatility. Therefore, controlling asset growth rate in the regression, the coefficient of dividend yield should decrease if the duration effect holds, and the both coefficients of payout ratio and dividend yield should decrease if the rate of return effect holds. According to this reasoning, asset growth itself should have a positive relationship with price volatility. Based on Allen and Rachim (1996), the following Equation 6 was established to test this hypothesis:

$$Pricevol = a_1 + a_2 Divyield + a_3 Payout + a_4 Earningsvol + a_5 Growth + a_6 Debt + a_7 Marketcap + a_8 Dum1 + a_9 Dum2 + a_{10} Dum3 + e$$

Table 11: Result of regression $Pricevol = a_1 + a_2 Divyield + a_3 Payout + a_4 Earningsvol + a_5 Growth + a_6 Debt + a_7 Marketcap + a_8 Dum1 + a_9 Dum2 + a_{10} Dum3 + e$

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.393676	0.049485	7.955	1.07e-12	***
divyield	-1.518524	0.517048	-2.937	0.003969	**
payout	-0.187958	0.050136	-3.749	0.000274	***
earningsvol	0.819378	0.282628	2.899	0.004445	**
growth	0.317758	0.107282	2.962	0.003681	**
debt	0.105173	0.092921	1.132	0.259932	
size	0.017901	0.005731	3.123	0.002237	**
services	-0.069313	0.031285	-2.216	0.028594	*
industrials	-0.057976	0.028276	-2.050	0.042488	*
financial	-0.110386	0.040631	-2.717	0.007559	**

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					
Residual standard error: 0.1054 on 121 degrees of freedom					
Multiple R-squared: 0.4874, Adjusted R-squared: 0.4492					
F-statistic: 12.78 on 9 and 121 DF, p-value: 4.013e-14					

Table 11 shows that controlling asset growth, the payout ratios negative relationship with price volatility increases one significance level (now significant on a 0,1% level) compared to Table 10. Also, asset growth itself has a significant (on a 1% significance level) positive relationship with price volatility. However, dividend yield's coefficient does not change significantly. Therefore, it could be concluded that this Finnish data set does not include proof of Baskin's (1989) duration effect, but some possible proof of the rate of return effect exists. It must be noted that dividend yield and payout ratio are highly correlated, making causality between the variables blurry, but assuming that the payout variable captures the effect of controlling asset growth, and simultaneously asset growths own variable have a significant positive relationship with price volatility, it could be stated that this data set includes proof of Baskin's rate of return effect. Allen and Rachim (1996) didn't find evidence of Baskin's (1989) effects in Australian data, but their asset growth variable was also statistically insignificant. In addition, controlling asset growth increases the difference of financial companies and technological companies (dummy included in the intercept) price volatilities to be significant on a 1% level. This could mean that financial companies price volatility reflects Baskin's reasons more than the other industries stocks.

5. Summary and conclusions

The results obtained from the regressions show significant negative relationships between stock price volatility and the two dividend policy variables, payout ratio and dividend yield. Also, earnings volatility and

market capitalization have significant positive relationships with stock price volatility. Payout ratio provides the most significant results, but the three other variables are approximately equally important determinants of stock price volatility. The variables of dividend yield, payout ratio and earnings volatility produce expected results, as suggested by Baskin's (1989) theory. However, market capitalizations significant positive relationship with price volatility is unexpected, and contradictive to Baskin's (1989) results, although Allen and Rachim (1996) reported similar findings. A possible explanation to this market capitalizations effect is the ownership-structure of public Finnish small cap companies, as family-owned businesses are more risk averse than widely owned ones. In addition, leverage does not have a significant negative relationship with price volatility, as it had in Baskin's (1989) and Allen and Rachim's (1996) papers. This is explained with leverages highly significant and negative relationship with earnings volatility, and banks reluctance to lend to companies with volatile earnings.

Except for market capitalization and leverage, this research presents a "middle road" between Baskin's (1989) and Allen and Rachim's (1996) findings. Baskin's (1989) results implied that dividend yield alone, with over double significance of any other variable, was by far the most important determinant of price volatility, with payout, earnings volatility and market capitalization having significant, but way smaller effects. Allen and Rachim (1996) stated that the major determinants were earnings volatility and leverage, while payout having a smaller but significant effect. The puzzling part in Allend and Rachim's paper was dividend yield's positive, yet insignificant relationship with price volatility. This research reports that dividend yield, payout ratio, earnings volatility and market capitalization are almost equally important and highly significant determinants of price volatility.

Therefore, the null hypothesis can be rejected. Multiple variables affect price volatility significantly, and even the technology industry has a significant impact. Considering Baskin's (1989) theory, the duration effect does not seem to hold in Finnish data. Even though dividend yield has a negative significant relationship with price volatility, controlling asset growth does not decrease the dividend yield coefficient. However, the addition of asset growth decreases the payout ratio coefficient significantly, and simultaneously dividend yield has a negative relationship and asset growth itself a positive relationship with price volatility. Assuming that payout captures the effect of controlling for asset growth, these findings imply that Baskin's rate of return effect holds in Finnish data. However, caution is required interpreting the results, as many of the variables used are highly correlated with each other, making the direction of causality unclear.

In conclusion, dividend policy affects stock price volatility in Finland, but earnings volatility and market capitalization have an equal impact as well. Therefore, a similar conclusion than Allen and Rachim (1996) reported can be stated: Baskin's (1989) suggestion that dividend policy on its own would affect price volatility is not supported by this research.

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Appendix

Appendix A.

The summary statistics of currently listed and delisted companies from Nasdaq Helsinki main list, from the time period 1992-2015.

Current companies	Price volatility	Dividend yield	Payout ratio	Long term debt	Asset growth	Earnings volatility	Market cap
Average	0,384	0,043	0,375	0,177	0,077	0,055	5,464
Standard deviation	0,128	0,020	0,261	0,099	0,085	0,038	1,936

Table 12: Summary statistics of currently listed companies (number of observations 96)

Delisted companies	Price volatility	Dividend yield	Payout ratio	Long term debt	Asset growth	Earnings volatility	Market cap
Average	0,442	0,031	0,256	0,215	0,074	0,058	4,970
Standard deviation	0,167	0,027	0,205	0,147	0,100	0,041	1,443

Table 13: Summary statistics of delisted companies (number of observations 35)

Comparing Tables 12 (currently listed companies) and 13 (delisted companies) gives expected results, as delisted companies have lower market capitalizations and higher price volatility and leverage. Also, delisted companies have lower dividend yields and payout ratios as currently listed companies. The statistics are expected: delisted companies usually face below normal financial performance, or even financial distress. Most delisted companies were acquired by competitors and delisted, some of them faced bankruptcy. Bad financial performance drives the market value of the company down, making the acquisition easier for the buying company.

Appendix B.

Table 14 reports the results from Equation 4. As seen, currently listed companies had a negative and insignificant relationship with delisted companies, meaning currently listed companies have slightly lower stock price volatility than delisted companies had, while listed. However, this relationship is statistically insignificant, so the results are not adequate to state that delisted companies' stock prices would have been more volatile than currently listed companies stock prices.

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.372447	0.048018	7.756	2.76e-12	***
divyield	-1.885640	0.524480	-3.595	0.000466	***
payout	-0.170347	0.051103	-3.333	0.001131	**
earningsvol	1.062768	0.279176	3.807	0.000220	***
debt	-0.009749	0.093194	-0.105	0.916851	
size	0.022711	0.005907	3.845	0.000192	***
current	-0.024375	0.022833	-1.068	0.287800	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					
Residual standard error: 0.1108 on 124 degrees of freedom					
Multiple R-squared: 0.4199, Adjusted R-squared: 0.3918					
F-statistic: 14.96 on 6 and 124 DF, p-value: 8.083e-13					

Table 14: Result of regression $Pricevol = a_1 + a_2 Divyield + a_3 Payout + a_4 Earningsvol + a_5 Debt + a_6 + Marketcap + a_7 Dum1 + e$

Appendix C.

Table 15

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.335700	0.045844	7.323	2.95e-11	***
div	-1.518524	0.517048	-2.937	0.003969	**
payout	-0.187958	0.050136	-3.749	0.000274	***
earningsvol	0.819378	0.282628	2.899	0.004445	**
growth	0.317758	0.107282	2.962	0.003681	**
debt	0.105173	0.092921	1.132	0.259932	
size	0.017901	0.005731	3.123	0.002237	**
services	-0.011336	0.023833	-0.476	0.635186	
technology	0.057976	0.028276	2.050	0.042488	*
financial	-0.052409	0.032779	-1.599	0.112454	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					
Residual standard error: 0.1054 on 121 degrees of freedom					
Multiple R-squared: 0.4874, Adjusted R-squared: 0.4492					
F-statistic: 12.78 on 9 and 121 DF, p-value: 4.013e-14					

Table 15 shows results from Equation 3, but now the industrial sector dummy is captured in the intercept, and the other dummies are reported related to the industrial sector. As seen, the technology dummy provides significantly more volatility, but the three other sectors report statistically similar price volatilities.